



## India's First CAR-T Cell Therapy Approved

**Keywords:** [CAR-T Cell Therapy](#), [Central Drugs Standard Control Organisation \(CDSO\)](#), Leukaemia, NexCAR19 (Actalycabtagene autoleucel), T- Cells.

**Description:** CAR-T Cell Therapy, Developments and their applications and effects in everyday life, Achievements of Indians in science & technology.

[Source: TH](#)

### Why in News?

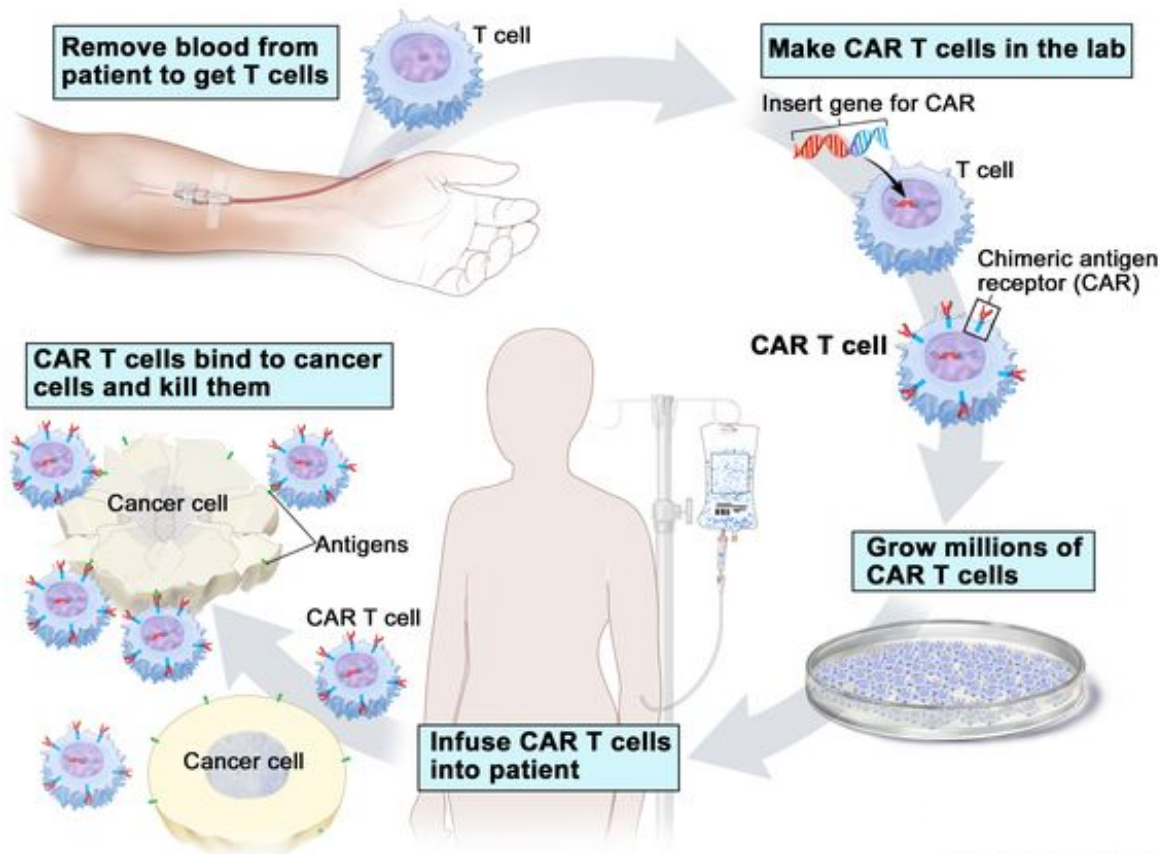
Recently, the IIT Bombay-incubated company **Immuno Adoptive Cell Therapy** has received [Central Drugs Standard Control Organisation \(CDSO\)](#) approval of the first humanized CD19-targeted [Chimeric Antigen Receptor T cell \(CAR-T cell\) Therapy](#) product called NexCAR19 (Actalycabtagene autoleucel) for use in cases of relapsed/refractory B-cell Lymphomas and [Leukaemia](#) in India.

- NexCAR19 is a result of a **decade-long collaborative effort between IIT Bombay** and Tata Memorial Centre (TMC) and has undergone rigorous clinical investigations and translational studies.

### What is CAR T-cell Therapy?

- **About:**
  - CAR T-cell **therapies are a major breakthrough** in cancer treatment.
    - Unlike chemotherapy or immunotherapy which involve taking drugs, CAR T-cell therapies use a patient's own cells. They are modified in the laboratory to activate T-cells and target tumor cells.
  - CAR T-cell therapy has **been approved for leukaemias** (cancers arising from the cells that produce white blood cells) and lymphomas (arising from the lymphatic system).
- **Procedure:**
  - T cells are taken from a patient's blood and then **the gene for a special receptor that binds to a certain protein** on the patient's cancer cells is added to the T cells in the laboratory.
    - The special receptor is called a chimeric antigen receptor (CAR). Large numbers of the CAR T cells are grown in the laboratory and given to the patient by infusion.

## CAR T-cell Therapy



### ▪ Significance:

- **CAR T-cell therapies are even more specific than targeted agents** and directly stimulate the patient's immune system to fight cancer, leading to greater clinical efficacy.
  - That's why they're referred to as "living drugs."

### ▪ Challenges:

- **Preparation:** The difficulty of **preparing CAR T-cell therapies** has been a major hindrance to their widespread use.
  - The first successful clinical trial was published a decade ago, and the first indigenously developed therapy in India was performed in 2021.
- **Side Effects:** In certain kinds of leukaemias and lymphomas, the efficacy is as high as 90%, whereas in other types of cancers it is significantly lower.
  - The **potential side-effects are also significant**, associated with cytokine release syndrome (a widespread activation of the immune system and collateral damage to the body's normal cells) and neurological symptoms (severe confusion, seizures, and speech impairment).
- **Affordability:** Introduction of CAR T-cell therapy in **India can face challenges** of cost and value.
  - Critics argue that developing CAR T-cell therapy in India may not be cost-effective as it will still be unaffordable for most people.

## What are T Cells?

- T cells, also known as **T lymphocytes**, are a type of white blood cell that play a central role in the immune response.
- T cells are involved in **cell-mediated immunity, which means they help the body recognize and respond to foreign substances**, such as viruses, bacteria, and abnormal cells, such as cancer cells.
- There are two major **types of T cells: the helper T cell** and the cytotoxic T cell.
  - As the names suggest, helper T cells 'help' other cells of the immune system, whilst cytotoxic T cells kill virally infected cells and tumors.

# TYPES OF BLOOD CELLS

## 1. Red Blood Cells (Erythrocytes)



Helps in O<sub>2</sub> and CO<sub>2</sub> exchange

## 3. Platelets (Thrombocytes)



Helps in blood clotting

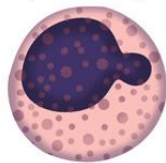
## 2. White Blood Cells (Leukocytes)



Neutrophil



Eosinophil



Basophil



Lymphocyte



Monocyte

Fights against infections

## What are the Government Initiatives Related to Cancer Treatment?

- [National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke](#)
- [National Cancer Grid](#)
- [National Cancer Awareness Day](#)

## UPSC Civil Services Examination, Previous Year Question (PYQ)

**Q. Which one of the following statements best describes the role of B cells and T cells in the human body?(2022)**

- (a) They protect the environmental allergens. body
- (b) They alleviate the body's pain and inflammation.
- (c) They act as immunosuppressants in the body.
- (d) They protect the body from the diseases caused by pathogens.

**Ans: (d)**